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DISEASES of the CHEST

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NOTICE: Annual Meeting of the Federation of American Sanatoria at Ambassador Hotel, Kansas City, Missouri, May 11-15, 1936

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Last year, 2400 pneumothorax treatments were administered at Devitt's Camp. This method of splinting the lung by injecting air into the pleural cavity gives the diseased lung complete rest, thus obtaining quicker healing. It also enables the tuberculous patient to resume his former activities much sooner than by the natural cure. No additional charge is made for Camp patients receiving this treatment. Each pneumothorax case is closely watched by the aid of the fluoroscope and roentgenograms. This treatment is given patients whenever possible.

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DISEASES OF THE CHEST

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(A MONTHLY PUBLICATION)

"The most important factor in diagnosis in the majority of cases of pulmonary tuberculosis is keeping the disease in mind."
Lawrason Brown, M. D.

Editorial Comment

Federation Meeting at Kansas City

THE FEDERATION OF AMERICAN SANATORIA will hold its annual executive session at the Ambassador Hotel in Kansas City on Monday, May 11th, 1936. Dr. William Devitt of Devitt's Camp, Pennsylvania, the president of the Federation, will preside at the first session which will open at ten a. m., and at all other business sessions throughout the day. All members of the Federation should make a special effort to attend these business sessions, as the policies of the Federation and of DISEASES OF THE CHEST will be discussed at length. It is particularly urged that all members of standing committees be present.

At noon there will be a luncheon for members of the Federation at the Ambassador Hotel. Dr. Max Rothschild of San Francisco will preside, and he is arranging an excellent short program of a scientific nature. This program will be announced in the May issue of DISEASES OF THE CHEST.

The closing business session will be called at 2:30 p. m.

The Federation's annual banquet will be held in the same hotel the evening of May eleventh. This is always a high light of any meeting, and your committee on arrangements promises something extraordinary. All members of the Federation, their wives, and friends are invited to attend.

On Page 30 in this issue will be found the program of the other activities of the Federation. These activities offer each Federation member an opportunity to meet his old friends and to make new ones among the chest specialists of the country. Make your plans now to be in Kansas City May 11th to 15th.

R. B. H., JR.

"Get-to-Gether" Luncheon

YOU are invited to be the guest of the Federation of American Sanatoria at a round table luncheon at Hotel Kansas Citian on the second day of the American Medical Association Session, Tuesday, May 12th.

The feature of the luncheon will be a scientific program one hour in length, by three nationally known authorities on tuberculosis. The same standard of practical subject matter as has characterized the articles in Diseases of the Chest will prevail in this program.

There will be nothing to sell, no solicitation of pledges, memberships or subcriptions, in short there is no joker in the deck. You are to be the guest of men doing tuberculosis and institutions treating tuberculosis at no expense to you and without obligation on your part. If we can bring to you in resume form what is hap-

pening in research and management of tuberculosis and do it pleasantly and painlessly, we will be gratified.

It would be a great service if you would register your acceptance with the Secretary, Dr. R. B. Homan, Jr., First National Bank Building, El Paso, Texas. We expect to have several hundred guests and early reservations are desirable.

Make your reservations now—

Then meet us at the Kansas Citian at noon Tuesday, May 12th. If you will do that I am sure our party will be a success for we are trying to send you home from that luncheon feeling that our program proved one of the high-lights of the A.M.A. Meeting.

LEROY S. PETERS,
Chairman
ORVILLE E. EGBERT,
Secretary

Session on Tuberculosis

ELSEWHERE in this issue there will be found an announcement of the preliminary program for the Session on Tuberculosis at the coming Kansas City meeting of the American Medical Association, Wednesday afternoon, May 13th.

The program has been addressed, as will be noted, to the topics of general interest related to tuberculosis, rather than to an effort to stimulate the interest of the men whose activities have long been in the field of tuberculosis, and whose interest therefore needs no stimulation. It has been deemed wise by the officers of this first session that this meeting should be devoted entirely to giving a rather broad background of the subject of tuberculosis; and it was with considerable regret that numerous excellent presentations on some of the more specialized subjects of interest in tuberculosis could not be included in the program. The limitation of the number of papers was also made by authority of the A.M.A., whose rules, of course, will govern this session just as much as any other meeting of the organization.

It is hoped to make this Session of sufficient interest and appeal that it can become a permanent part of the meetings of the A.M.A. This, of course, will only be possible as a result of the interest manifested in the Session. Every member of the American Medical Association and particularly those interested in the Federation of American Sanatoria are most cordially invited and urged to attend the Session and aid it by their helpful discussions.

C. H. C.

The Pneumothorax Directory

PNEUMOTHORAX is now more widely used than ever before. As a result, there has been a large increase in the number of patients under pneumothorax treatment in all parts of the United States. Many of these patients lead a fairly active life, and many of them travel, some out of necessity and others for pleasure, most of them with the consent of their physician.

When a pneumothorax patient contemplates a trip, it has always been a problem for his physician to assist with his itinerary, which of necessity should include the consideration of when and where he may receive his refills.

To the individual patient, for whom the loss of his collapse might spell disaster, it is very important that his refills be continued at the proper intervals during his travels. Then, again, there is the patient who is about to leave the sanatorium and it is necessary to select a physician, in close proximity to the patient's home, who is equipped to continue the pneumothorax treatment. Also, the physician in the general practice of medicine should have available for ready use, a pneumothorax directory for referred patients.

For these reasons, the Federation of American Sanatoria is now compiling a Pneumothorax Directory that will give complete information concerning physicians in the private practice of diseases of the chest who administer pneumothorax.

We feel that this directory will prove useful and that it will work in the interest of both the patient and the physician; and

that it will serve to better acquaint the physician with those men who are thoroughly equipped to administer pneumothorax and in whom both he and his patient may have every confidence. C.M.H.

Negro Health Week THE 22nd Annual Negro Health Week will be observed throughout the United States, March 29th to April 5th, 1936. The United States Public Health Service, State, County and City Health Departments are co-operating with the National Medical Associations, the Negro National Business League, and the National Negro Insurance Association, in holding this important health week.

Through this great movement much progress will be made in furthering the health conditions of the negro race, especially by the continued co-operation of the above named agencies. C. M. H.

To Believe or Not to Believe NOW AND AGAIN we are warned that the tuberculosis problem is solved and that, from inference at least, there will be no tuberculosis shortly. How shocking then to learn of our high morbidity and mortality incidence among Negroes and Indians for example. Of course the clinician who sees the advanced case in his practice and in the sanatorium is not easily encouraged to contribute to the insignificance of tuberculosis even among our enlightened white race, armed by all the weapons knowledge has to offer, and still unprotected from the white plague. Although reasoning and philosophy have no place in our modern scientific calendar, yet, as long as we only hear of educational diagnostic campaigns and do not enforce them, we should be permitted at least reasonable questions concerning our blessed oblivion. A few questions at random remind us that the dark ages of tuberculosis have not passed. Can we with any certitude tell our patients where the tubercle bacillus came from and why it is so persistent in its survival in the human being? I would remind you of the recent discourses on filterable and easily changed forms. Koch first described a spore form and then denied it. Which is correct? How long will it be before we can tell our patients that they are free from tuberculosis, or vice versa, and not err? Can we say that tubercle bacilli can pass through normal organs or not? When is a patient a closed case? Have you been fooled also? Can you blame the skeptics when it comes to the value of treatment, and especially collapse therapy? We are convinced; but remember they, as skeptics, should spur us on to a better solution; and until then, tuberculosis will still remain a specialty; we hope not for long, but while it lasts, let's face it conscientiously and diligently. Yours for the answers to these and many more questions on our hobby, which space will not permit here. A. M.

National Tuberculosis Ass'n Meeting THE 32nd Annual meeting of the National Tuberculosis Association will be held in New Orleans April 22nd to 25th, inclusive.

The preliminary report indicates an interesting program which is especially well balanced. A very important symposium on "Tuberculosis in Youth" will be given on Friday, April 24th at 9:30 a. m. Also there will be an interesting discussion "Putting our knowledge of tuberculosis to work *through the Physician.*" This discussion will be held on Friday, April 24th at 2 p. m. In our opinion the above subject will cover one of the weakest links in our anti-tuberculosis campaign. We feel that the physicians themselves, when properly versed in modern concepts of the tuberculosis problem, will do more toward the control of tuberculosis than any other agency. The above discussion should prove to be very timely. The whole program, however, is very interesting and we urge all our readers to attend this year's meeting at New Orleans. C. M. H.

Write or wire now for reservations for the Kansas City Meeting. Headquarters: Ambassador Hotel, W. W. Buckingham, M.D., Chairman Committee on Arrangements, 814 Professional Building, Kansas City, Missouri.

Indications for Pneumothorax*

BY
WILLIAM DEVITT, M.D.
Allenwood, Pa.

IT HAS been conceded for many years that rest is the important factor which enters into the curing of any organ of the body. It has been found that in surgical tuberculosis rest plays the most prominent part of the treatment. It has been recognized for the last ten years that this also applies to the lung. In 1822 James Carson, thinking over the serious accidents which happened to many of his advanced cases of tuberculosis when a spontaneous pneumothorax took place, realized that in many cases this spontaneous pneumothorax was a beneficial procedure for, although many of them died immediately, many others were benefited by the happening. Thus he conceived the idea that it might be well to effect an artificial pneumothorax.

In 1822 he published a paper about this and a man named Sloan, who was suffering from tuberculosis, came to Carson and presented himself for this treatment. Four members of Sloan's family had died with tuberculosis and he had just returned from the West Indies where he had gone in an unsuccessful search for health. Carson and one of the big surgeons, Bickleman of London, attempted to do this artificial pneumothorax by the open method. They cut down through the intercostal muscle, through the pleura, and attempted to puncture the pleura, believing they could, perhaps, let air in from the outside. Unfortunately, Sloan was not a good case for experimentation. He was an advanced case, with dense pleural adhesions and it was impossible to separate the pleura. Carson was discouraged and did not again attempt it until years later, and again was unfortunate in his selection of a case and was unable to do it. In 1894 Forlanini, thinking along the same line as Carson, attempted it much after the technic we use to-day and was apparently more fortunate in his selection of a case; this man had a free pleura and he was able to induce some air. That same year in Chicago, Murphy, working along the same line and without any thought of the work Forlanini was doing, was struck with the same idea and was able to successfully carry it out.

The operation did not come into favor immediately, but in the last ten years much work has been done on it. The technic has been bettered greatly though I believe we are not yet at the end. The aim of this procedure is to introduce into the pleural cavity air or gas which will compress the lung and put it at rest. Rest is just as essential to the lung as to any other organ. When we realize that the lung moves up and down at the rate of about 23,000 times a day, that it never rests, that it is always in a state of distention, that even the strongest exhalation does not expel all the air, that the air cells never approximate each other, we are impressed with the quantity of work this organ must do. The present plan calls for introducing air at atmospheric pressure or greater; this overcomes the condition of negative pressure which is the normal condition of the pleural cavity; expresses air out of the air cells and in so doing collapses the lung. The completeness of the collapse depends more or less on the amount of pleural adhesions and the location of such adhesions. As a result of this procedure the lung is immobilized; the 23,000 movements a day are ceased; no air enters into it. The same procedure takes place when a surgeon puts a splint on a broken arm. The splint does not heal the arm any more than the air in the pleural cavity cures the lung, but with the lung at rest the diseased part has a chance to heal.

There is also a relaxation of the elastic tissue taking place as a result of this

*Read at Pennsylvania Tuberculosis Society, Allentown, Pennsylvania, Feb. 25, 1936.

compression. One of the greatest benefits derived is that the lung empties itself of its contents. We are often asked by our patients why, when the lung is collapsed, they do not get well immediately. They are not able to see the process that is taking place. I should like to compare this process with that which takes place in an old sponge which has become very much soiled from neglect and has not a pleasant look nor a pleasant odor. We can conceive it being filled with water and after the water is squeezed from it, being of much smaller volume, but we must remember we still have the same old dirty sponge; we do not have a new, sweet smelling sponge, a delight to feel and handle. The same thing applies to the lung that has been emptied of its air; we still have the same pus pockets, we still have the walls of the cavities which have been filled with pus, we have the lung exactly the same as we had it before we did the artificial pneumothorax but minus the air and minus much of the pus which has been squeezed out. The fact that it is quiet, the fact that we have now approximated the alveolar walls, brings about the healing of the diseased areas and also prevents a spread of the toxin through the lymph channels.

One of the most beneficial effects as I see it is that mixed infections cannot enter the lung. I believe that most of the unpleasantness of tuberculosis is due not so much to the tuberculosis itself as to the mixed infection, entering through the bronchial channels and coming in contact with the toxin of the tubercle bacilli and the diseased areas. It is this infection which causes in great part the night sweats, headaches and extremely high temperature we so often encounter. I believe the straight tubercle bacilli seldom causes a temperature of 103 and 104 degrees. This, however, is found in many cases when a mixed infection gains access to the lung.

Artificial pneumothorax also prevents a spread of the disease to the other lung. You can very readily understand that when a person is an open case and expectorates billions of tubercle bacilli, many others are not expectorated but are lodged in the bronchial tubes and are very easily inspirated into the contralateral lung.

It is believed by some authorities that the reason certain cardiac cases with the weakened compensation show so much resistance to tuberculosis is due to the passive congestion which takes place because of the broken compensation. They believe that this passive hyperemia is a detriment to the tubercle bacilli; that it enters much into the defense of tissue. The same condition is found in a lung that has been subject to artificial pneumothorax; the blood stream is slackened very appreciably. Not only is the blood stream slackened but the lymph stream is also compressed.

The lymph stream plays a great part in carrying the tubercle bacilli from one part of the lung to another and when this lymph stream is compressed and slackened, this passage is broken. This was demonstrated some years ago by a German who compressed the lung of several animals and then compelled them to inhale large quantities of soot. The autopsy showed that the uncompressed lung was much more filled with soot than the compressed lung.

Selection of Cases.—All cases are not suitable for artificial pneumothorax and it is difficult to know which case will respond more readily. Many cases which we consider absolutely unsuitable give us the best results, and vice versa.

Acute Progressive Case.—The acute progressive case may be particularly suitable and give us good results at the time but later we are often much disappointed to find the case begins to slip and does not respond to the treatment in the manner we hoped. This is due to the fact that the resistance in the acute case is very low. They have not had time to build up this resistance, with the result that walls break down, disease spreads and the case terminates unfavorably.

Chronic Cases.—A chronic case, on the other hand, which may not seem to be

a good case at the start, may respond very well even if pleural adhesions prevent a complete collapse. This is due to the fact that these cases *have good resistance.* Over the period of years which the patient has been afflicted he has built up this resistance that is so vital and so important as a curative factor.

Cases Not Doing Well.—Then we have the cases that are not doing well under general treatment. It is conceded by all men who do tuberculosis work that many cases do well under the ordinary regimen—rest, fresh air and good food. Here again it is difficult to tell which case will get well, and again it is the question of resistance. In fact the question of resistance in tuberculosis is the main factor, determining whether the case is going to get well or going to slip, and entering into the pneumothorax case it must be given the same consideration as in every treatment. These cases, not doing well under general treatment, should undoubtedly be given the benefit of artificial pneumothorax treatment. The fact that the case is one of fibrosis does not interfere with this selection even though both lungs are involved. This is especially true if there is cavity formation in one. It is important, however, that this cavity does not have thick walls, but here again we will find that if we follow this rule too closely we will miss many cases which might have been benefited.

Cavities.—It is safe to believe that in all treatment of tuberculosis it is imperative to close all cavities, either small or large. I believe we will get very few cures in cavity cases unless this law is observed. Pneumothorax will accomplish this in many cases.

Many times it is necessary to assist the pneumo with some method of phrenic nerve treatment or, in case of adhesions holding and preventing closure, by pneumolysis. If these do not suffice, and other conditions warrant it, a thoracoplasty should be considered.

Hemorrhage. — The most spectacular case which enters into the treatment is that of hemorrhage. I know of no way to control a hemorrhage except by compression. I know of no drug that has any influence on it, but often after the induction of 300 or 400 c.c. of air, which seems in many of these cases to have a selective action and goes to the weakened place, the result is astonishing—the hemorrhage ceases. In attempting this procedure on hemorrhage cases we must remember that we are dealing with an already broken lung. If our enthusiasm or our fear compels us to proceed with too much haste, putting in large quantities of air without knowing the condition of our pleura, without knowing whether the tuberculous process has worked out into the visceral pleura and already caused an adhesion between the visceral and the parietal pleura, we may do more damage to the patient than the hemorrhage is going to do, because an excess of pressure may pull off a part of the visceral pleura. If we do this we get a spontaneous pneumothorax with resultant pyopneumothorax.

Even a small quantity of air seems to have a selective action. This is due, of course, to the fact that in the involvement of the periphery of the lung, this area is much softened and the air is able to exert much more pressure on the softened area than it does on the well portion of the lung.

Sometimes it is very difficult to know from which side the hemorrhage is coming. You must then use your own judgment and if, after several air treatments, the hemorrhage persists, I believe you should discontinue the treatment on the supposedly involved lung and induce pneumo on the other side. In our experience this has been successful in several cases.

Bilateral Cases.—The fact that both lungs are involved is no contraindication, provided the one side is fairly good. Most of our artificial pneumothorax cases have bilateral tuberculosis. There is a compensatory emphysema which takes place in the contralateral lung causing a dilation of the alveolar walls and the bronchioles so that the patient is using just as much

air as before the one lung was partially collapsed. However, this is not always true. The strain of adjustment for the other lung, which is also somewhat involved, may prove too great for it and it may break down and may even go on to hemorrhage. It is then a question of determining the right procedure—whether to risk small hemorrhages in the contralateral lung and continue pneumothorax on the badly diseased side or allow the badly diseased side to reexpand, perhaps helping it to reexpand by drawing air out of the pleural cavity, and then instituting a partial pneumothorax on the heretofore contralateral side.

It is important and good common sense that in bilateral cases both sides should not be started at the same time. Sufficient time should be allowed for the stabilization of the circulation, both respiratory and cardiac, to take place before attempting the closure of the contralateral lung. If this precaution is taken it is remarkable how well most patients handle a bilateral operation.

In some bilateral cases we find a walled cavity in one lung and evidence of a more acute spread in the other lung. Matson has suggested closing the recent involvement first, disregarding, for a time, the cavity. He has found it is often possible to bring enough pressure on the cavity by displacing the mediastinum, thereby getting beneficial results. We have tried it several times and are well pleased with it.

Advanced Cases.—Some believe that all advanced cases should be given a chance with artificial pneumothorax and this seems logical to me. Ten years ago Fishburg felt that only the acute and apparently hopeless cases should be given this treatment. Many authorities differed with him then and I think many more differ about it today. My own opinion is that in five years from now we will be using artificial pneumothorax in many cases where today we are not considering the treatment.

Spontaneous Pneumo.—A spontaneous pneumo should always be converted into an artificial one. Great care must be taken not to increase the rupture. This is where the x-ray plate and the fluoroscope are so important.

Positive Sputum. — Positive sputum is always an indication for pneumothorax treatment. While it is true some cases after four or six months of bed rest become negative, yet I see no reason to wait if it is possible to do a pneumo.

It must be remembered that if we wait too long there is always the possibility of adhesions forming which may minimize the results of our treatment. Of all the forces that lessen the value of the treatment certainly adhesions play the biggest part. We must always keep in mind the possibility of a spread to the other lung.

Pleurisy With Effusion.—I believe that in all cases of pleurisy with effusion the fluid should be aspirated and replaced with air. I do not believe that we should strive for a complete collapse in all cases but in many cases of tuberculosis, pleurisy with effusion is one of the cardinal symptoms. If we allow the inflamed pleura to contact, all hope of doing a later pneumo is lost. This neglect will lead to much regret later on in the cases we were led to believe were not of tuberculous origin.

Contra-Indications.—At Devitt's Camp we recognize few contra-indications. The *acute miliary tuberculosis* is certainly one. The disease advances so rapidly and in many cases so much damage to tissue takes place even before a diagnosis can be made that this type of treatment seems to be of no avail.

The *dense fibroid cases with emphysema* are not suitable unless there is a bleeding cavity or one that we are afraid will bleed, even then this is only at best palliative treatment and no beneficial ultimate results can accrue from it.

We do not recognize *involvement of the larynx or intestines* as a contra-indication unless these conditions are severe. Fishberg, however, found that all of his pneumothorax cases that died suffered from

(Continued to page 26)

The Responsibility of the General Practitioner in the Treatment and Prevention of Tuberculosis

BY
F. M. POTTENGER, M.D.
Monrovia, California

WHILE it should be self-evident that medicine owes the same duty to the tuberculous patient that it owes to one suffering from any other disease, yet until now it has not recognized this duty. In recent years, however, the fact that tuberculosis has been proved to be a curable and preventable disease is forcing physicians to accept it in the same spirit that they accept diseases of the heart, or kidney, or pneumonia and diabetes.

Since 1900 the death rate from tuberculosis in the United States has fallen from 200 per hundred thousand population to less than 60 per hundred thousand. Does this bear the interpretation that our problem is seven-tenths solved, and that our death rate will continue to lessen at the same pace, and that the remaining three-tenths will be wiped out in another fifteen years? I am sure that no optimist expects such a result. However, optimistic students of the problem expect further reductions to be slower, but yet to be accomplished at a gratifying rate.

No doubt the progress made so far has been in some respects the easiest because tuberculosis has been so common that every one has been acquainted with it and nearly every one has felt its heavy touch upon some member of his family or upon some intimate friend. The reduction of the number of deaths from 200 per hundred thousand to 60 is reducing the acquaintanceship with the disease to such an extent that we already hear its relative infrequency commented upon.

If the recognition of this decreased frequency should carry with it the recognition of its curability and preventability, all would be well and good. On the other hand, if it should carry such a feeling of security as to breed a tendency to lessen the vigilance which has made the accomplishment possible, then the result would be disastrous.

In the future it may be much more difficult to hold the interest of organizations which have been in the forefront of the battle against tuberculosis than it has been in the past, so we must supplement that part of lay interest which has been due to self-interest because of fear of the disease, by an awakened interest on the part of the general medical profession. The humanitarian aspects of the disease may be expected to continue to interest both physicians and laymen.

Physicians who graduate today have their minds more on chronic disease than formerly was the case, because of the decline in incidence of the acute infections, on the one hand, and the increase of the degenerative disease due to our aging population, on the other hand; so it will not be out of line for medical practitioners who are graduating today to develop an interested understanding of the problems associated with the diagnosis and treatment of tuberculosis.

While it is true that the diagnosis of tuberculosis requires a somewhat different approach to the patient than some of the diseases in which the profession has been more intimately interested, yet the approach is simple and rational and within the grasp of every well trained physician. The treatment of tuberculosis requires on the part of the physician, aside from a fundamental knowledge of the disease, and understanding of the physiologic principles which are essential to its healing, a peculiar psychology which enables him to maintain an interest over a period of months during most of which time the patient may feel in a state of almost perfect health. While this psychology may not be attained by all, yet it is quite reasonable to expect physicians to know the measures which are used therapeutically and if unable to apply them, themselves, to refer the patients to those competent to do so.

The field of diagnosis can be taken over

by general medicine except in the most difficult cases. The average case presents little difficulty in diagnosis because the disease is usually well established when a physician is first consulted. Unless patients present themselves for examination earlier in the future than they have in the past, not more than twenty per cent of cases should give the general men any great difficulty in making a diagnosis. They might experience difficulty, however, in estimating the severity of the lesion and in choosing the particular therapeutic measure or measures which would offer the best chance of cure.

I have long taught that general medical men should accept tuberculosis as a disease which should receive their best endeavor the same as such diseases as those of the heart, gastrointestinal tract, and kidney, and then study it so as to give themselves confidence in dealing with it. Then their apathy would soon be replaced by an intelligent interest. Then better and earlier diagnosis would be the rule. This is a duty which the profession owes to itself, as well as to the tuberculous patients who consult them.

A carefully taken history with an analysis of the symptoms, a good X-ray plate, and a proper examination of the sputum should enable the physician to detect at the time of the first examination most of the cases that seek medical aid. Where uncertainty exists a careful study of the history will usually help the examiner decide whether or not further study or consultation is necessary.

For more than twenty years I have been making use of an etiologic classification of symptoms. By considering symptoms in connection with their etiology it has helped me very much in determining the presence or absence of activity, and I recommend it to the general man as being of great value. The classification is as follows:

Etiologic Grouping of Common Symptoms of Pulmonary Tuberculosis

GROUP I SYMPTOMS DUE TO TOXEMIA	GROUP II SYMPTOMS DUE TO REFLEX CAUSE	GROUP III SYMPTOMS DUE TO THE TUBERCULOUS PROCESS PER SE
Malaise	Hoarseness	*Frequent and protracted colds (tuberculous bronchitis)
Lack of endurance	Tickling in larynx	Spitting of blood
Loss of strength	Cough	Pleurisy (tuberculosis of pleura)
Nerve instability	Digestive disturbances which may result in loss of weight	Sputum with or without bacilli
Loss of appetite	Circulatory disturbances	
Digestive disturbances (hypomotility and hyposecretion)	Chest and shoulder pains	
Metabolic disturbances resulting in loss of weight	Flushing of face	
Increased pulse rate	Spasm of muscles of shoulder girdle and crus and central tendon of diaphragm	
Night sweats	Diminished motion of affected side. Lagging	
Elevation of temperature	If chronic, degeneration of apical soft tissues	
Anemia		
Leucocytic changes		

*Strictly speaking, "colds" should not be listed among the symptoms; for the "cold", as so often described, is a syndrome of acute spread of infection; a large reinoculation with tuberculoprotein; or caseation and cavitation.

This classification shows the three factors which are operative in producing symptoms: the toxins, with their action upon the nervous system, the endocrine system, and the cells of the body; the reflexes, which are transmitted through the vagus and sympathetic nerves which supply the lung; and the tuberculous inflammation locally in the lung and pleura.

It readily will be seen that the toxic group is only present when the disease is active and the patient is absorbing poisons, a condition which is often absent for quite long periods during the chronic course of tuberculosis. One must expect to find these symptoms only when the disease is distinctly active. Some of the reflex symptoms, however, will remain even until the disease is healed.

The most significant of the three groups of symptoms is the one caused by the tuberculous process *per se*, because these are produced in the tissues where the inflammation exists.

Hemorrhage is due to the inflammatory condition producing injury to the local blood vessels.

Pleurisy is caused by a subpleural involvement, or an infection of the pleura itself.

Sputum is a result of the inflammation in the lung stimulating the mucous cells, or producing necrosis of tissue in which case the focal contents with bacilli are expelled. If the sputum contains tubercle bacilli, of course, the diagnosis is readily made.

However, it is important that the physician understand something of the accuracy of sputum examination. Any case which is decidedly suspicious should not be turned down as being non-tuberculous simply because bacilli are not found by the ordinary method of examination, for it requires the presence of large numbers of bacilli to find them by the usual Ziehl-Nielson technic.

Hemorrhage, if it consists of an amount approaching a half teaspoon of bright blood, should be considered as coming from a tuberculous focus, unless proved otherwise. Other causes of spitting of blood are bronchiectasis, lung abscess, malignancy, and certain other rare infections.

Pleurisy, whether it be dry or pleurisy with effusion, is nearly always tuberculous if it comes on without some definite cause such as pneumonia, or an injury to the ribs.

Frequent and repeated colds can not be strictly interpreted as a symptom of tuberculosis, because it is a syndrome of increased activity, in which numbers of symptoms are present. Nevertheless, it is a frequent complaint of the patient.

An analysis of the symptoms according to this classification will prove to be very helpful—more helpful than considering each symptom as an entity. This classification shows that there are three factors and not thirty or forty individual symptoms to be considered. Rarely is active tuberculosis present without more than one group of symptoms being represented.

The medical man who first sees the tuberculous patient can render a service for which he can never be adequately renumerated, by advising him how to conduct himself so as to minimize the danger of further spread of the disease and of its further breaking down. Oftentimes the correct advice at this time will save months of treatment, reduce the crippling effects of the disease to a minimum, and may even save life. The confidence which patients put in the medical profession demands intelligent advice at this crisis.

The patient suffering from active tuberculosis harbors as great a threat to life as the one with acute appendicitis, yet the chronicity of the disease clouds the prognosis. The death of the tuberculous patient four or five years after the disease has been discovered is no less the result of a failure to properly advice than the death in appendicitis which takes place a few days after improper advice is given.

Active tuberculosis calls for immediate rest and the establishment of a properly devised hygienic and physiologic regimen just as much as appendicitis calls for

surgery. What further will be needed is not so urgent.

The general physician must know the principles of treatment and see that they are applied at once on a diagnosis of active tuberculosis having been made. While there are certain cases in which there may be little danger of doing harm by a less strict regimen, yet these require a more comprehensive analysis than would be expected of one who sees only a case now and then. So for safety, bed rest should be ordered until it is definitely determined how and by whom the patient is to be treated. If the physician is able and sufficiently interested to carry out the treatment himself, the permanent regimen should be established at once. If not, the patient should be quickly referred, for time is often an important factor in determining the future usefulness and even the life of the patient. If the physician does not have the confidence in his own ability to handle the acute phases of the disease, he could advantageously send his patient to some well conducted sanatorium for education and treatment until this phase has passed. This educational phase of sanatorium treatment has not been sufficiently emphasized in the past.

Not only can the general physician who is tuberculosis-minded and who has confidence in his ability to render service to the tuberculous patient diagnose the disease and establish and decide the nature of the treatment, but he can render another great service by examining those who have come intimately in contact with open cases. It is not difficult to give a tuberculin test; it is nothing that any graduate in medicine can not do after a few moments of instruction.

In case any one who has come in contact with an open case reacts to tuberculin, an X-ray should be taken to see if the pulmonary tissue is involved. If the X-ray shows the infection to be confined to the primary focus and regional glands, and if no evidence of activity is present, no treatment need be instituted. However, reactors should be re-examined at intervals of from three to six months, and at any time should there be any evidence of interruption of the normal well-being of the reactor.

The physician should be careful to explain that while reaction means infection, it does not mean disease. The test is protective, particularly in children, in that it puts the family physician in possession of the knowledge of the fact of infection and permits him to guide the child during the period of development.

What greater service can the general physician render to any family than to diagnose tuberculosis at once should any member become afflicted, apply the proper treatment when it is diagnosed, and study those who have been exposed, and reassure them that no infection is present; or pick out any that may have become infected with the assurance to the family that with proper guidance there is little likelihood of their breaking down.

This is the type of service that general physicians can take the responsibility of rendering if only they will. This is the type of service that will insure a continuation of the decline in the death rate of tuberculosis, and a merited confidence in medicine on the part of the public.

Convention Issue

THE May issue of DISEASES OF THE CHEST will be a special convention edition and will be dedicated to the progress made in combating tuberculosis in Missouri.

The papers for this issue will be contributed by the physicians of Missouri, who have had an important part in and are especially trained for tuberculosis work. Important phases of tuberculosis activities, including data and photographs of the sanatoria of the state will be a feature of this issue.

The committee in charge is making every effort to pay a tribute to the State of Missouri, which is honored this year in having the meeting of the American Medical Association at Kansas City.

Murray Kornfeld, managing editor of the DISEASES OF THE CHEST is establishing headquarters at Kansas City to assist the committee in compiling this *Special Missouri Edition.*

The Diagnosis of Incipient Pulmonary Tuberculosis

BY
JOHN B. HAWES, 2nd, M.D.
Boston, Mass.

THE DIAGNOSIS of incipient pulmonary tuberculosis has long been looked upon as a difficult task and an intricate procedure involving special knowledge and facilities. This is not the case. An early diagnosis of tuberculosis depends upon three factors, each of which is well within the reach of any practitioner. These three basic factors are:

1. That the physician takes the time necessary to get acquainted with the patient so that he will be at ease and so that he may bring out the essential details of the patient's story.

2. Next, willingness on the part of the physician to weigh each symptom carefully and to pick out the essential points brought out in his subsequent physical examination. This in every case should include records of temperature and pulse, not in the doctor's office which are of little or no value but taken quietly at home under *normal conditions*. Having secured all this data, taking time to go over all of this carefully, eliminating the non-essentials and retaining only that which has a distinct bearing on the case.

3. Finally, securing additional help in the way of an x-ray examination *interpreted by an expert* along with certain laboratory tests, chiefly the examination of the sputum.

The task of obtaining all this is not difficult providing the physician is willing to *take the time*, nor need it be unduly costly. With this evidence at his disposal he should be able to answer these three questions:

(1) Has this patient tuberculosis of his lungs?

(2) Is the disease in active form and is it the cause of his symptoms?

(3) If so, what should be done about it?

Now let us take up more in detail the procedures outlined above necessary to make a diagnosis of incipient tuberculosis. First comes the patient's own story. This cannot be hurried. At all times and in every case it is important to bear in mind that one is dealing with a human being worried and apprehensive and *not* with what may or may not turn out to be merely a case of tuberculosis. At the beginning it is well to ask the direct question, "What brings you to my office?" and to follow it up with another one, "When did you last feel perfectly well?" With this as a starting point, continue from there on. Bear in mind that any cough or cold with or without sputum which lasts from 4-5 weeks should be investigated. It may not mean tuberculosis but it *does* mean something. Remember likewise that there is no cough which is typical of tuberculosis. Hacking coughs, dry coughs, chest coughs or that mysterious stomach cough mean nothing as far as tuberculosis is concerned. Raising of blood *in any quantity* should be investigated while if the patient states that he has raised as much as a *teaspoonful* of blood the physician may well feel that tuberculosis is present until the contrary is proved. A history of pleurisy with effusion justifies a tentative diagnosis of tuberculosis. Loss of weight is only important providing it *cannot* be explained. Dietary fads are so frequent nowadays that the fact that the patient has lost 15-20 pounds may and often does mean little or nothing. Loss of strength and energy although important if proven is a vague affair at best and always difficult to evaluate.

Above all, put no faith in what a patient may say concerning the presence or absence of a fever or a rapid pulse. In every case secure this data for yourself. Likewise, put no faith in temperature and pulse observations taken in your own of-

fice. Show the patient how to use a thermometer and how to take his own pulse; give him a chart with directions to take temperature and pulse in the late afternoon and in the evening—at 4 and 8 p. m. —for three or four days and have him send this chart to you. This is the only way to get accurate information on this subject. For over 25 years this has been my invariable custom and it has been only in the rarest instance that a few minutes' instruction has failed to instruct the patient in accurate temperature and pulse observations.

In your physical examination see that sufficient clothing is removed so as to enable you to examine easily every part of the chest. In going over the patient's lungs in every case remember what you are looking for, namely, *localized persistent rales,* usually at an apex. Percussion is coming to be a lost art although in the hands of experts it gives much valuable information. Palpation and inspection usually yield comparatively little but if on using the stethoscope one hears *fine* crackles at one apex and if these persist after the patient has been taught to cough and then to breathe in and out immediately afterwards, you have sufficient evidence on which to base a provisional diagnosis of tuberculosis at least. Changes in voice or breath sounds in the early cases are not particularly important. One may truthfully say, therefore, that just as the presence of tubercle bacilli in the sputum makes the diagnosis a definite one while the absence of such germs proves nothing at all, so the elicitation of fine, cracking rales which persist after the patient has coughed is an important point in your positive diagnosis, but likewise, the fact that such rales are *not present* does *not* prove that tuberculosis is *not* the correct diagnosis. I have often felt that in the detection of these early cases if the stethoscope were used less and the thermometer and observations of pulse used more fewer mistakes would be made.

Now we come to the x-ray. Formerly, the expense of an x-ray examination often prevented the obtaining of this important evidence. Nowadays when clinics and dispensaries, sanatoria and hospitals so abound there is no excuse for not having the help of an x-ray examination in every case where tuberculosis is suspected. If you are not accustomed to reading x-rays yourself, do not attempt to do so in this instance. In most cases the practitioner is quite at the mercy of the roentgenologist. If he is a conservative and sound man he will report to you as to his findings which may be, for instance, that there is "diminished radiance" and "evidence of parenchymatous infiltration at one apex" which is *probably* of tuberculous origin or which *suggests* an early tuberculosis process. If, however, he attempts to state whether that aforesaid process, the shadow of which he sees on the x-ray film, is active or inactive and *is* or *is not causing* symptoms, I should be inclined to disregard his report altogether and to take the film and to have it interpreted by someone else. I am firmly of the opinion that it is only in the *rarest of instances, if ever,* that the roentgenologist is entitled to give a definite opinion concerning activity or inactivity. He might well say, and often has a perfect right to say, that *in his opinion* the shadow, from its "haziness" or "softness" or its "snow-flake" appearance *suggests* activity. Further than this he has no right to go. It is the duty of the patient's physician from his own observation of temperature and pulse and from his careful sizing up of other signs and symptoms elicited from his history and examination to decide whether or not the patient is suffering from *active* pulmonary tuberculosis.

Finally, a word concerning laboratory tests. Of these, the examination of the sputum is the only one of real importance, certainly from the point of view of the general practitioner. Tuberculin tests, blood studies, sedimentation rates and others may well be left to the specialist and to the laboratories and institutions for tuberculosis. Remember, however, as I have emphasized early in this

(Continued to page 28)

Calcium Therapy in Tuberculosis*

BY
BENJAMIN GOLDBERG, M.D. F.A.C.P.
Chicago, Ill.

THE utilization of calcium as a therapeutic agent in the treatment of tuberculosis has been based for many years on the supposed demineralization theory. Many writers reported an excess of calcium salts in the urinary and alimentary excreta in the presence of active tuberculous disease and therefore felt it was necessary to replinish the body tissues. In discussing calcium, we do not lose sight of the other mineral salts (phosphorus, etc.) which have important parts in body function, yet are little understood.

In recent years considerable experimentation in this field has given rise to many new ideas as to the value of this substance. Many investigators have attempted through feeding calcium or calcium compounds to increase the deposition of lime salts into areas of tuberculous disease in the hope of creating calcification which would result in healing. This only occurs in a very small proportion of patients with the disease. There is, however, at the present time a definite understanding that an increased calcium intake in itself does not affect the blood or tissue calcium unless certain activating substances are present to aid in the tissue deposition of calcium with a consequent increase in its absorption.

Some studies in tuberculosis that relate to calcium have resulted in definite conclusions. Peterson and Levinson have reported more deaths among tuberculous patients with a low blood calcium. Those patients with a higher blood calcium evidenced a healed or healing lesion and, therefore, a good prognosis. There were, however, instances in their series in which a high blood calcium was found, associated with an advanced lesion, which change these investigators attribute as due to a transfer of the calcium from disintegrated tissue to the blood.

Cantarow reports that in a series of patients with a chronic fibroid tuberculosis a considerable variation in respect to the diffusibility of the serum calcium was present; an increased diffusibility in active exudative cases; and a decreased diffusibility in benign proliferative types. Cantarow, also, in studying the diffusible calcium ratio in sixteen patients having advanced exudative lesions, all clinically active, four of which patients were critically ill, demonstrated a diffusibility ratio of 117 to 152, the ratio in normal, healthy individuals being 82 to 115.

In a series of eleven individuals with fibroid tuberculosis, none of whom were critically ill, the diffusibility ratio varied from 56.7 to 80.1. Thirty-six patients showed a normal range—82 to 115—these latter all having chronic ulcerative tuberculosis in varying stages of activity. In this latter group there appeared to be no correlation between calcium distribution and the nature or extent of the pulmonary lesion. Increased diffusibility of blood calcium denotes increased permeability and it appears that an increased ratio of diffused to non-diffused calcium is associated with the exudative types of tuberculosis, while a subnormal diffusibility ratio occurs in proliferative or fibroid tuberculosis.

Peterson, with his "blister test", shows the presence of diminished permeability through the skin capillaries in fibroid tuberculosis, but in the exudative types of the disease the permeability seems to be definitely increased.

One might also mention the work of Ellman, who, recognizing the place of the parathyroid gland secretions in calcium metabolism in the body, studied the histologic structure of such glands in the tuberculous and noted evidence of increased function in such tissue sections, which would, according to this worker, depict the need for an increased calcium intake.

*From "Clinical Tuberculosis," by Benjamin Goldberg. Published by F. A. Davis, Philadelphia, 1935.

The work of Peterson and Levinson in capillary permeability, and my personal work with Reed, has led me to feel that calcium is important and that its value in tissue reactivity is to stabilize tissue cells and to control the phenomenon of sensitization or allergy. In tuberculosis this may be summed up as follows:

Initial or primary infection in the human host creates a sensitization or reactivity of tissue to further infection with tubercle bacilli. This sensitization or reactivity is manifested in its most minute form by cell irritability, which when marked, allows of increased cell permeability and, therefore, increased capillary permeability. A new infection with tubercle bacilli stimulates this sensitization procedure so that exudate is poured out as a result of cell irritability and permeability. Such exudate may either fix the bacilli in situ or may also be an attempt on the part of nature to wash these irritating bacilli from the tissue cells where they have settled.

This is normally considered a defense reaction on the part of tissue cells in the presence of organisms which may propagate, but where extensive exudate is thrown out and carries bacilli, invading new tissue, it may create new pathological entities and endanger the patient. The degree of tissue reactivity and capillary permeability, resulting from the irritation of the infecting organism, is dependent upon the irritability of the single cells and the permeability manifested by such cells. An increase in the calcium content of the body tissue and blood apparently tends to lessen cell irritability and capillary permeability, thereby lessening the amount of exudate, hardening, as it were, the fixed tissue cells, preventing an extension of the infecting organisms and tending to limit the destruction by their toxins.

The improvement of calcium metabolism in the body seems to be largely dependent upon certain specific, activating substances, of which the most important, to our knowledge, at this time, is vitamin D. Before discussing the role of vitamin D, I would mention other associated conditions which effect this metabolism.

When taken into the body by the alimentary tract, calcium absorption is based on several factors. The hydrogen ion concentration of the small bowel is important, inasmuch as an alkaline medium tends to cause insoluble calcium salts. Kahn and Roe have shown adequate absorption in calcium feeding when calcium is given between meals, at which time intestinal alkalinity is not so marked. Bernheim states that the fats may through combination with calcium, form insoluble soaps, and oxalic acid found in some vegetables may form insoluble calcium oxalates. An excess of phosphorus in proportion to calcium may also form an insoluble tertiary calcium phosphate. Bergeim demonstrated increased calcium and phosphorus absorption in the presence of calcium lactose feeding because of increased acidity, due to lactic acid fermentation. Mellanby has determined that decreases in calcium and phosphorus absorption occur with quantities of bread, oatmeal and maize and rice in the diet. It would, therefore, seem important to heed these results of experimentation in calcium feeding.

The amount of calcium to be given and the type of calcium has created controversial discussion. It seems wise in the light of recent work on the importance of phosphorus in conditions where a deranged calcium metabolism is the most prominent clinical feature, to administer calcium in combination with phosphorus. This is warranted on the basis that a large dietary excess of phosphorus inhibits adequate absorption of calcium, and may even draw on the calcium of fixed base reserves of the body, resulting in a negative calcium balance; likewise a large excess of dietary calcium may be expected to combine with phosphorus, drawing it from the body stores, and resulting in its excretion as calcium phosphate. It is by thus feeding a large excess of calcium as compared to phosphorus that rickets is experimentally produced. For this reason it seems advisable to use one of the cal-

cium phosphates. Powdered bone meal, essentially tricalcium phosphate, is available commercially; I have used a mixture of this material with dicalcium phosphate. The advantage of using such inorganic preparations is that calcium and phosphorus are supplied in approximately the same proportion as is required for the calcification of tubercles. Calcium gluconate and lactate may be given for immediate emergency. The dosage should be from 10 to 20 grains three times daily to supply evident needs or dietary deficiencies.

Vitamin D. The efficiency of calcium metabolism is apparently dependent upon the presence of certain conditions in the body, as pointed out above, in addition to the presence of activating substances, of which vitamin D at this time stands out as most important. We would not here delete the thought that some of the other vitamin substances may and do act as synergists in stabilizing the mineral metabolism of the body.

The research of Mellanby, of Hess, and of McCollum pointed the discovery of vitamin D in foodstuffs, as did Huldschinsky, with ultraviolet light, in determining its anti-rachitic value. This anti-rachitic action is dependent upon changes in the calcium and phosphorus chemistry of the body. Recent experimentation as to the value of vitamin D has been extended to other disease syndromes, particularly the sensitization or allergic group of diseases.

Vitamin D, in sufficient quantities, has the ability to mobilize calcium in the blood, acting singly or possibly through the parathyroid hormone. It thus, if given in adequate amounts, may produce a hypercalcemia with increased deposition of calcium into tissue cells, and a resulting increased calcium absorption. This complex mechanism of biochemical activity influences cell and capillary permeability and, therefore, exudative processes which are factors in cell reactivity, sensitization or allergy.

1. *Codliver Oil*—This oil has been used empirically for many centuries in the treatment of pulmonary tuberculosis without any definite knowledge of its action. More recently, with the extension of knowledge of vitamins, has come a realization of its importance in the maintenance of the mineral metabolism in the body through its vitamin D content. In addition, it has a liberal vitamin A content, traces of iodine, biliary salts and other substances. The fat content is of importance as a food in the patient of poor nutrition. Preference is given to codliver oil in vitamin D feeding in the general diet of the tuberculous. Cod liver oil here is given in amounts of one-half to one ounce three times daily after meals. The codliver oil selected for use should be one of the products of a reputable manufacturing concern with adequate testing facilities. Where obesity is present, or additional vitamin D is necessary, a fortified preparation containing viosterol may be utilized, so that smaller amounts of the oil may be given, yet dispensing an adequate amount of vitamin D. Where personal distaste to the oil is present, it may be given in such vehicles as orange juice, tomato juice, wine, etc. Even in such vehicles patients may manifest digestive upsets or may have other idiosyncrasies and refuse to take this important substance. Vitamin D may then be given in the form of irradiated ergosterol (viosterol).

2. *Viosterol.* Applying the knowledge that ultraviolet rays had an anti-rachitic factor, Hess and Anderson and Griffith and Spence have shown that the wave lengths most potent in developing this substance existed in the ultra-violet zone between 302 and 265 millimicrons. Irradiation of ergosterol with ultraviolet produces a substance which may have a potency as regards the anti-rachitic element ranging from 200,000 to 700,000 times that in the average codliver oil, making necessary dilutions to the potency of 100 times the standard codliver oil, which is the common commercial preparation.

The dosage of viosterol which we have used until recently has approximated 20 to 40 drops, using the dropper furnished when the product is purchased.

Pulmonary Moniliasis . . .

A Brief Resume of the Clinical, Pathological and Diagnostic Phases of the Disease and its Treatment

BY
JACK C. NORRIS, M.D.*
Atlanta, Ga.

Historical: In a previous report attention was called to Reubold (1), who in 1834, reported that he had found oidia in human respiratory passages. This observation was followed by others, and Raum, in 1891, produced death in a rabbit by inoculating the animal with yeast. In 1894 Busse published his experiences with yeast pyemia, and subsequently numerous other instances of yeast infections have been described in the literature. In recent years Kotts and Fleischer, (2) Lewis (3) and Stovall, (4) have each added considerable information concerning the importance of these fungi, in that they have presented patients with lesions proved to have been caused by pathogenic yeasts. Information is now available of sufficient amount and scientific accuracy to state several positive facts, (a) that certain yeasts are disease producers and (b) that such organisms may infect and damage numerous tissues, especially those of the meninges and the lungs. (5)

Bacteriology and Classification: The pathogenic yeasts, referred to in this paper, conform to a large group recognized as Monilia, which Castellani has classified according to sugar reaction. They may be further classified into two sub-groups, (a) those that produce conidia and ferment several sugars, and (b) those that only grow by budding, and that only ferment an occasional sugar. Other cultural features are usually definite, in that the growing colonies can be easily recognized by their grey-white color, elevation, homogeneity and feathery irregular edges. As a rule these yeasts grow best on acid glucose agar. Repeated transplantation, however, enables them to grow on any enriched medium. Technically, a culture should be grown many months on various medias, at several different temperatures before their true classification is attempted, or else the organism might be erroneously named. It should be remembered that the yeasts are plemorphic and full of cultural surprises. Even the better bacterologist may be fooled by their behavior. In our laboratories we make first transplants on Sabouraud's media, from freshly obtained sputum collected in sterile containers, after a thorough mouth cleaning. Colonies are selected on the fourth or fifth day of incubation and are then transferred to a large series of different carbohydrates. Later, we make animal inoculations while the culture are young. For this purpose the rabbit is one of the better animals. The injections are made in accordance with technical procedures, as outlined in a previous report by the author. (7) As a rule pathogenic yeasts will produce granulomata about the inguinal glands. If given intravenously, they nearly always produce a severe septicemia with especial involvement of the kidneys, liver, spleen and peritoneum. Nasal instillations often cause a pneumonia or an enlargement of the tracheobronchial glands. Such findings in an animal are of sufficient importance to classify a yeast as pathogenic and are in accord with Castellani's postulates for pathogenicity.

Clinical Features and Occurrences: The patient's main complaint will usually be that of a chronic, very productive, cough with sputum of watery consistency that contains much grey-white, semi-coagulated, mucinous material in which may, or not, be small specks of blood. The sputum has often been noticed to have a definite pungent smell, strongly simu-

*From the Department of Pathology, Grady Hospital, Atlanta, Georgia.

lating the odor arising from fermenting yeasts. Associated with the cough may be sore mouth, sub-costal pain, occasional irregular fever and headaches. Loss of weight is not an important complaint unless the disease has lasted several months. Physical examination will disclose a few rales, most often in the lung bases or about the hilus—seldom in the apices. X-rays in several cases have revealed irregular fanlike areas of increased density in one, or both bases, though in the beginning nothing of importance may be visible in the negatives. Most of the patients observed by the writer were males and as a rule they appeared to have been well developed people before their illness. It is important to remember, however, that in nearly every patient there was a history of another disease. One person had a lung abscess, another stomach trouble and still another heart disease. All of which indicates that the yeasts most likely implant themselves best upon previously damaged tissues. The organisms may be associated with bronchiectasis, bronchitis and streptococcic processes and in children who have thrush. Tuberculous individuals may be affected and the infection may delay recovery from tuberculosis. I have been astounded at the number of instances in which yeasts occur in the sputum of tuberculous individuals. In a survey of two sanatoriums (9) I found yeast in the sputum of 15 per cent of those examined and in a large number of these, tubercle bacilli could not be found in the sputa. This observation seems important for it seems that pulmonary yeast lesions can simulate tuberculosis and such lesions should be differentiated for the former is curable with specific therapy, while tuberculosis consumes months of time and patience, aside from the economic factors involved, and eventually may often prove fatal.

Pathology: The histology of yeast lesions has been ascertained through animal inoculations. The pulmonary lesions in the animal consist grossly of small tubercle-like processes of a grey-white color. Historically these areas often simulate atypical tubercles. There are occasional giant cells, numerous fibroblasts, lymphocytes and plasma cells, all of which represent a chronic or slow growing tissue reaction. Within and about such inflammatory areas may be seen yeast cells.

Necropsy studies in the infected human are rare. Lewis (3) described a patient whose lungs had many small pus cavitations about the small bronchioles in which yeasts were present in enormous numbers. Microscopically, Lewis encountered pseudo-tubercles composed of fibroblasts, mononuclears, epethelial, plasma and a few atypical giant cells with an associated marked fibrosis.

The other pathological features of moniliasis are concerned with the blood. Most patients have no increase in circulating leukocytes and instead there is a leukopenia with lymphocystosis. The red cells may be decreased and a moderate anemia may be present. The blood constituents, such as non-protein nitrogen, etc., are not involved.

Complement fixation tests may be positive, with antigens of high titre, yet such tests are not diagnostically dependable. Agglutinins are present in the blood but seldom in greater quantities than 1-20 to 1-60 dilutions. An interesting phenomena has been observed in that normal healthy polynuclears will quickly ingest yeasts in large numbers when incubated in blood serum obtained from a patient with moniliasis. Such a reaction is of dependable diagnostic value.

Diagnostic Criteria: The patient's sputum should first be examined grossly for the physical characteristics that have been described. The smaller tenacious particles of sputum are best dissolved upon a slide in 10% sodium hydroxide, covered with a cover glass, and examined under a low power lens. The yeasts are easily recognized by their buds and mycelia or their double contour with surrounding

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capsules. A Grams stain will reveal that yeasts retain the gentian violet. The sputum should be examined in the above manner for several days and the continued presence of yeasts alone is sufficient for establishing a tentative diagnosis. Other criteria are also important in that they establish the diagnosis beyond questionable doubt. They are as follows:

1. Repeated positive cultures with recovery of the same type of yeast.

2. Repeated smears showing the continual presence of yeasts in the sputum.

3. Blood positive agglutinating tests, 1-20, 1-60. Higher titre very significant.

4. Phagocytic index should indicate increased phagocytic ingestibility of yeasts.

5. Animal inoculations should prove the yeast to be capable of producing the infection in rabbits.

6. Sugar reactions and cultural characteristics of the organisms should conform to types of yeast pathogens now recognized as disease producers.

Treatment: As stated before, a careful physical examination of the patient should be made and it is of great importance to exclude tuberculosis and other wasting diseases such as malignancy and metabolic maladies. It now becomes important to see that the patient is first given fluids in considerable quantities in conjunction with alkalies so that acidosis and dehydration may be prevented. Constipation, if present, should be corrected and a diet of bland, nourishing, non-acid forming foods should be given. For specific medication potassium iodide in increasing size doses should be administered. Sodium iodide given intravenously, grains 5, is of great value. If the process is refractory to iodides, it is important to use sterile aqueous gentian violet 0.5% solution each week—6 cubic centimeters in the patient's veins. Very few reactions occur from this solution. Violet ray is helpful. At other times, a yeast vaccine seems to aid in recovery and if the patient has a mixed streptococcic yeast infection a streptococcus vaccine, given prior to or along with the specific treatment, is often productive of excellent therapeutic benefits. The chemicals referred to above are specific for yeasts. This has been established by the author in a previous report. (10) As a rule, patients with pulmonary yeast infection run a chronic course and eventually recover. Occasionally death occurs, most often from complicating diseases.

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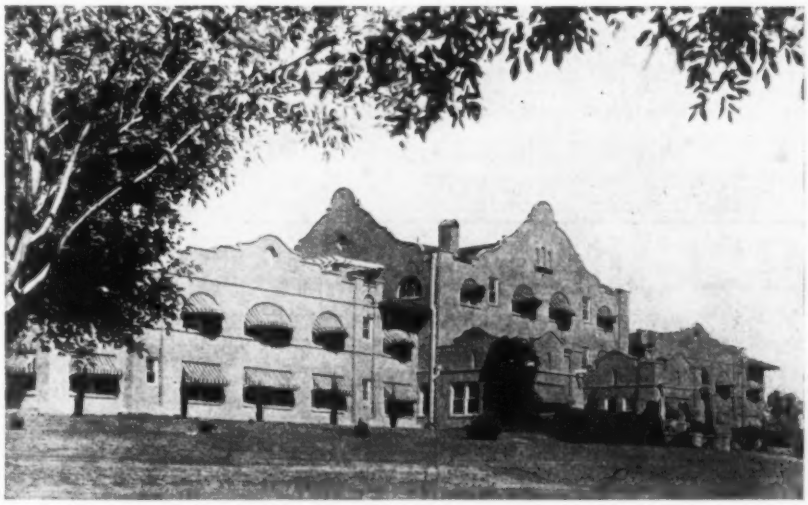

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INDICATIONS FOR PNEUMOTHORAX . . . . . (Continued from page 11)

a severe intestinal tuberculosis.

A mild *cardiac or renal condition* is no contra-indication although a severe one is.

Age may be a factor. We do not look with favor on cases over 50 though, to be sure, these are rare. *Early pregnancy or diabetes* are not contra-indications.

Pleural adhesions themselves are not contra-indications but may interfere very much with getting a satisfactory collapse. In many of these cases the best we can do is find a pocket and upon the size of the pocket depends the degree of benefit given the patient. This pocket acts the same as the fibroid case —the treatment is only palliative as the adhesions tend to hold open the part you wish to close.

I feel *asthma* is a very strong contra-indication unless the asthma can be proven to be of bacterial origin. In these cases a vaccine may work wonders. It is true of course that if the paroxysms can be controlled we eliminate the cause and the patient, under strict observation, may stand the pneumo well.

Pneumo on Left Side.—Matson believes he gets better results in left-sided cases. He thinks this is due to the fact that in the right-sided case there is pressure on the right heart and superior vena cava.

Every man who is doing much artificial pneumothorax work would greatly rejoice if there were some standard by which we could determine the length of time the lung should be collapsed. It depends on so many factors that it is difficult to decide just when a lung should be allowed to reexpand. We believe, however, the best results are obtained in cases where the lung has been collapsed four or five years. This must be decided by the general condition of the patient. As long as the patient shows any signs of activity—temperature elevation, rapid pulse—I would suggest keeping it collapsed. At the Camp we allow it to reexpand slowly, watching it carefully. There is no reason, of course, why the patient should not return to work after the symptoms of activity have ceased and the resistance is somewhat built up. The physical signs would be of no benefit in making this decision, constitutional symptoms must be the guide.

I believe it is essential to watch all pneumothorax cases very closely with the fluoroscope. At the Camp we fluoroscope our patients every week. It is certainly necessary to have the patient under close observation when the treatment is started. It should not be started at home or, if started at home to control a severe hemorrhage, the patient should be moved immediately to a hospital before the next treatment is given.

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THE DIAGNOSIS OF INCIPIENT PULMONARY TUBERCULOSIS . . . . (Continued from page 17)

paper that absence of proof is not proof of absence. The fact that the notice comes back to you from the City or State Health Department with the words: "Tubercle bacilli were not found in the sputum", means nothing more or less than that in that particular minute particle of microscopic pus or cheesy material which was examined the germs were *not* present. In one of my cases it was only after the fortieth sputum examination that tubercle bacilli were found. This is an important point to remember at all times, that the fact that the sputum is negative does not prove that the patient does not have incipient tuberculosis.

With all this data in the vast majority of cases it should be possible to state fairly accurately whether or not an early tuberculous process is present and a cause of the patient's symptoms but in every case take no chances. If you are in doubt, do not tell the patient or his friends that you cannot make a definite diagnosis or that you cannot find anything wrong but state that there evidently is something wrong but that you cannot tell them exactly what it is and that it is absolutely necessary to keep the patient under observation until a decision is reached. This is the only way to avoid tragic consequences later on. Finally, although we are dealing here with diagnosis, one word as to treatment. In the vast majority of cases the diagnosis of tuberculosis even in its most incipient stage should mean a stay at a sanatorium for a while at least. The treatment of tuberculosis is to a large extent one of educating the patient and even his friends and relatives. This process of education can be carried on infinitely better in a sanatorium with experts in charge than in the home. In almost every case it pays to talk frankly and openly if not with the patient certainly with some member of his family. Impress upon them the importance of health and how necessary it is to take every precaution not to lose it. But whatever course of treatment you advise remember at all times that it is based upon rest, physical and mental, and remember likewise that success in the treatment as well as in the diagnosis of tuberculosis depends upon dealing with human beings and not with cases.

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